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Report on

Present and Future Space Requirements at the Wentworth Street Bus Depot

For

The Hamilton Street Railway Company

March 1977



JAMES F. MacLAREN LIMITED

CONSULTING ENGINEERS, PLANNERS and SCIENTISTS



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Ref.: 10938

March 17, 1977

Mr. F.A. Cooke
General Manager
The Hamilton Street Railway Company
18 Wentworth Street North
Hamilton, Ontario
L8L 5V1

Wentworth Street North Terminal Garage

Gentlemen:

In a letter dated November 30, 1976 this firm was invited to submit a proposal to study the present Wentworth Street North Bus Depot with the view to determine the following:

- (a) how many vehicles should the H.S.R.C. attempt to store on these premises, and
- (b) how much more space would be required at the same site to operate storage and maintenance facilities under modern standards to maintain the site as the main base for the H.S.R.C. and C.C.L. fleets.

We have now completed our investigations and the following report summarizes our studies.

We wish to acknowledge with appreciation the most friendly assistance and co-operation rendered to us by members of the Hamilton Street Railway Company during the preparation of this report.

.../2

March 17, 1977

If any matter contained in this report requires further explanation we will be pleased to meet with H.S.R.C. at their convenience to supply such information as required.

All of which is respectfully submitted.

Yours very truly,

JAMES F. MacLAREN LIMITED



J. F. Morrison
J. F. Morrison
General Manager
Civil Engineering



B. Heine
B. Heine
Project Manager

BH/bhr



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1. INTRODUCTION

The Hamilton Street Railway Company has met continuing expansion of its bus and trolley fleets to satisfy the ever growing transit requirements of the public.

The site at Wentworth Street North however from which the Company operates, has virtually not changed over the years to keep pace with the expansion of the fleet.

This situation has developed now into a condition where it is practically impossible to expand the fleet further without also enlarging the present site, or considering an additional second site for the operations.

The management and staff of the H.S.R.C. have to be highly commended that they have made it possible to operate for so long under these congested conditions. It is evident though, that overcrowding does exist and this must have an adverse effect on the efficiency of personnel working in what are by current standards essentially below average conditions.

This report investigates and describes space and operational aspects which are associated with storage and movement of buses for daily service requirements only.

Repair facilities and other operational aspects associated with the operation of the Wentworth Street facility were considered beyond the terms of reference of this study and have not been included in this report.

2. TERMS OF REFERENCE

The existing Wentworth Street North Terminal is well located with respect to providing service to the Hamilton area. Particularly attractive is the fact that due to the site location dead-run mileage is at a minimum. This results in a more economic and efficient operation than would be possible at some other more outlying site.

It is therefore understandable that the company wishes to retain the present Wentworth Street North facility but wants to know the limitations of the site if operation is based on modern standard requirements.

Based on the before noted letter requesting proposals and further communications with management of the H.R.R.C. the terms of reference for the study may be summarized as follows:

1. Collect all relevant data with regard to existing structures and facilities of the Wentworth Street North site. Check critical building dimensions and obtain other required information. Upgrade existing building and layout plans.
2. Analyze alternative operational flow patterns and parking arrangements and determine how many vehicles should be maintained on the present site using modern standards.
3. Analyze alternative operational flow patterns and parking arrangements within an expanded site using modern standards.

It should be noted that all investigations of the present and expanded site, or a completely new site had to consider that the H.S.R.C. fleet, contrary to most other public transit fleets has in addition to diesel and gasoline powered vehicles a considerable number of electric trolley buses.

With present day emphasis placed on pollution control and energy conservation it is considered that the trolley bus component of the fleet could even increase in future.

3. EXISTING SITE

The existing Wentworth Street facility is located east of Wentworth Street North and bounded by Wilson Street in the north and King Street in the south.

The site comprises some 5.8 acres of which about 3.3 acres are open yard. The rest is covered by various buildings housing all service, repair and administrative facilities of the Hamilton Street Railway Company.

The site was originally considerably smaller and was used as a streetcar yard. Over the years and after several expansions the site was converted into the present bus depot.

The substantial electrical facilities peculiar to a streetcar operation and normally absent in a bus-only facility are still put to good use and utilized today by the trolley-bus fleet of the company. The site is open to all three abutting streets, i.e. Wentworth, Wilson and King Streets.

The facilities and the existing site are shown on Figure 1.

The structures shown contain the following various facilities and functions:

Main Building - This structure facing Wentworth Street North is partially two storey and houses all administrative offices of the company as well as most of the repair facilities, body shops, paint shop, work shops, storage rooms, boiler room, electrical substation and several other miscellaneous areas with various functions.

Service Building - This structure, located in the centre and at the east side of the property accommodates washing, cleaning and two repair lanes for the trolley buses. This building also includes a small boiler room, storage rooms and some offices and a small cafeteria constructed as a second floor over parts of the building.

Ticket and Cash Office - This long narrow two storey building located near King Street accommodates the ticket and cash handling facilities, also the dispatch office and an upstairs operators room.

Storage Building - This single storey block structure constructed in the yard near Wilson Street is used for storing various materials, batteries, etc. It should be noted that in all present and future storage requirement investigations it has been assumed that this building will be demolished.

Present Operation - The present site is used to store and service a fleet of 276 buses, of which 50 are electric trolley buses. In addition to this number belonging to the Hamilton Street Railway Company the fleet of Canada Coach Lines numbering some 100 buses is also using the Wentworth Street North facilities for maintenance and repairs.

By adding up all vehicles using the site it can readily be seen that under present conditions every available space in the yard as well as inside the buildings is utilized. Conditions get particularly congested during the off-hours when most of the fleet is at the site.

As noted previously Figure 1 shows the present utilization of the site. The present storage arrangement of the buses is shown in blocks, the first number indicating the number of parked buses followed by another number which indicates the length of the buses, i.e. either 35' long buses or 40' long buses.

As would be appreciated, under these extremely crowded conditions no opportunity exists for a concentrated service operation and consequently the present operation can not be compatible with modern requirements.

Buses are fueled in the open yard area as they return from runs. This frequently involves lost time in maneuvering vehicles from one position to another to gain access to the pumps due to the limited yard space, and a substantial number of vehicles may come off their runs within a few minutes of each other.

Cooling water, engine oil, tires and batteries are checked in the various storage areas at each bus. Such an operation is time consuming and hence costly. Proper checking is difficult since there is only limited space available at the sides and ends of the buses where access is required. In most cases the level of lighting in between lines of parked buses is also inadequate for effective working.

Washing and cleaning is carried out in one service lane, fronts and backs are washed by hand. The washer is located at the end of the lane with little space between washer and the outside. This causes the buses frequently to ice-up during the winter months and renders the wash inoperative.

Provision of well laid out and well lit service lanes are therefore very important and can speed up and increase the efficiency of the whole servicing operation. It makes possible the adoption of a production line technique by driving the buses to the service units. This results in reduction in servicing time and personnel and much improved control of the operation.

The whole attempt to streamline the daily service operations will however be frustrated if not enough room is also made available in the yard to accommodate the free movement of buses between storage areas and service facilities. In the case of the Wentworth Street North site this requirement of providing unobstructed free movement lanes is somewhat complicated due to the fact that a substantial section of the fleet consists of trolley buses which are limited in their movement by the availability of overhead power lines.

Figure 2 indicates the storage capacity of the existing site to be 183 buses considering only existing facilities but providing open lanes between storage and service.

The operation of other facilities such as repair, body shop, paint shop, etc. carried out at the Wentworth site were beyond the terms of reference of this report and are therefore not discussed. It stands to reason however that these operations due to every available space being utilized for storing buses, are also greatly limited in their efficiency.

4. EXPANDED SITE

Expansion to the south toward the intersection of King and Wentworth Street has not been considered at the present time due to the commercial nature of this area.

This area would in all probability be too expensive for the size and benefit that it could offer.

The most obvious expansion available to the present site is towards the intersection of Wentworth and Wilson Street.

The benefits to H.S.R.C. owning this land are:

- Approximately 61 additional buses could be parked on the site.
- The short existing dead-end street from Wentworth Street into the company site could be closed off and acquired from the City of Hamilton and added to the Yard. This should be possible since no private owner will be abutting to this street.
- Even if not used for bus parking, the property can be used to expand the office and/or repair facilities which may well be required for the expanded H.S.R.C. and C.C.L. fleets.
- As will be shown later this additional property will be very beneficial to the H.S.R.C. if some elevated storage is to be provided at the site.

The layout of the expanded facility showing additional bus parking is shown on Figure 3.

5. FUTURE DEVELOPMENT

Two alternatives and limitations of development of the Wentworth Street North site, i.e. existing site only and expanded site have been discussed in the previous sections. A further alternative became apparent during the study. This alternative would utilize the whole expanded site but would also provide additional storage of buses on an elevated area.

The construction of such elevated parking area would provide bus storage for another 112 (40') buses and thereby increase the total capacity of the site to accommodate a fleet of up to some 318 buses. This number could be stored without undue difficulty and still provide open traffic lanes compatible with modern standards for proper operation of the site.

The most suitable area within the site for the construction of an elevated parking facility would be along Wilson Street between the street line and the existing repair building.

The structure is envisaged of reinforced concrete with the upper level accessible by two ramps which could have heating provisions for winter operation.

The street level could be either open or closed and the design could be carried out in a manner which would allow the addition of a future roof is desired.

The construction cost at today's prices of the elevated storage is estimated to be in the range of \$20.00 per sq. ft. or \$1.70 million for 85,000 sq. ft. of required additional space. For comparison purposes a new storage garage located elsewhere with necessary light repair and servicing facilities would cost in the neighbourhood of \$30.00 per sq. ft. or \$2.55 million.

It should be noted that the figure for elevated storage was arrived at without the benefit of soils information and preliminary design and should be considered conceptual only. The cost estimate is based on a largely precast reinforced concrete structure, open faced on the ground level with some screening provided for the elevated buses. The estimate includes the provision of fire protection by sprinklers and general lighting. An allowance for engineering cost and contingencies is also included but not the cost of any land required for the expansion.

Figure 4 shows a preliminary layout of this alternative indicating ground and elevated parking separately.

The trolley bus fleet would initially still remain at 50. An increase in trolleys would require rewiring and/or addition of overhead power lines. The study of this aspect was beyond the terms of reference of this report.

It is our opinion that together with the decongestion of the present or expanded site, (with or without elevated parking) the facilities for the daily services should also be increased and updated. The present building used for this purpose could easily be extended to provide for the whole range of service activities. These would include fueling, washing, cleaning with checks made on engine oil, cooling water, tires, lights, doors, batteries, transmission oil, etc.

Fare box (and cash) handling could also be transferred to this area and made part of the service lane operation.

As far as space requirements are concerned, Figure 4 shows the expanded service lanes.

Other aspects of the operation such as servicing, repair etc. have been mentioned only very generally. Being beyond the terms of reference no attempt has been made to work out any details in this regard.

It is suggested however that the H.S.R.C. undertake a detailed review associated with the whole range of these operational aspects once it has been decided in which direction the future development of the Wentworth Street North site will proceed.

6. CONCLUSIONS AND RECOMMENDATIONS

The conclusions of our investigations into the various aspects of this study are as follows:

1. The Wentworth Street North site is, due to its central location in relation to the area served, excellent. Dead-run mileage is at a minimum.
2. Site has good access and egress, being accessible from three sides.
3. The site is presently completely overcrowded.
4. A number of service facilities is outdated and require replacement.
5. Facilities can be expanded on the present site only by means of reduced storage.
6. Property could be acquired adjacent to the present site along Wentworth Street.
7. The main building and service building could be utilized in any future expansion scheme.
8. Taking modern standards into consideration, the present site can accommodate a maximum of approximately 183 buses (in addition to the 12 small buses presently operated by the company).
9. Approximately 244 buses could be stored on the expanded site if all property along Wentworth Street North were owned by the H.S.R.C.

10. The expanded site could accommodate a total fleet of approximately 318 buses if elevated storage is provided.

Based on the above conclusions the following is recommended:

1. Due to its central geographical location the Wentworth Street North garage be retained as the main operating facility for the H.S.R.C. and C.C.L. fleets.
2. Property along Wentworth Street be acquired for future expansion.
3. In order to maintain economic and efficient operation, not more than the number of buses as noted in the conclusions be stored on the site under the various schemes.
4. Considerations be given to the provision of elevated storage. This alternative could accommodate a fleet in excess of 300 buses (this number is incidentally the approximate optimum for any fleet operating from a single location). The further advantage of this scheme is that it retains the whole H.S.R.C. operation for the time being in one location with the corresponding savings in facilities, labour and supervision.
5. If it is decided to retain the present and expanded site, the H.S.R.C. undertake a study of the future service and repair requirements of the combined H.S.R.C. and C.C.L. fleets together with all other aspects of the operation in order to be able to integrate all planning, budgeting and phasing of any contemplated expansions of the Wentworth Street site.

FIGURE 1

HAMILTON STREET
RAILWAY COMPANY,
HAMILTON, ONTARIO

**EXISTING STORAGE AND
SERVICE LAYOUT OF
WENTWORTH ST. N. GARAGE**

50 - TROLLEYS
61 - 40' BUSES
154 - 35' BUSES
265 TOTAL + 12 SMALL BUSES

BUS OR BUSES

← DIRECTION OF
TRAVEL

0 20 40 60 80
FEET

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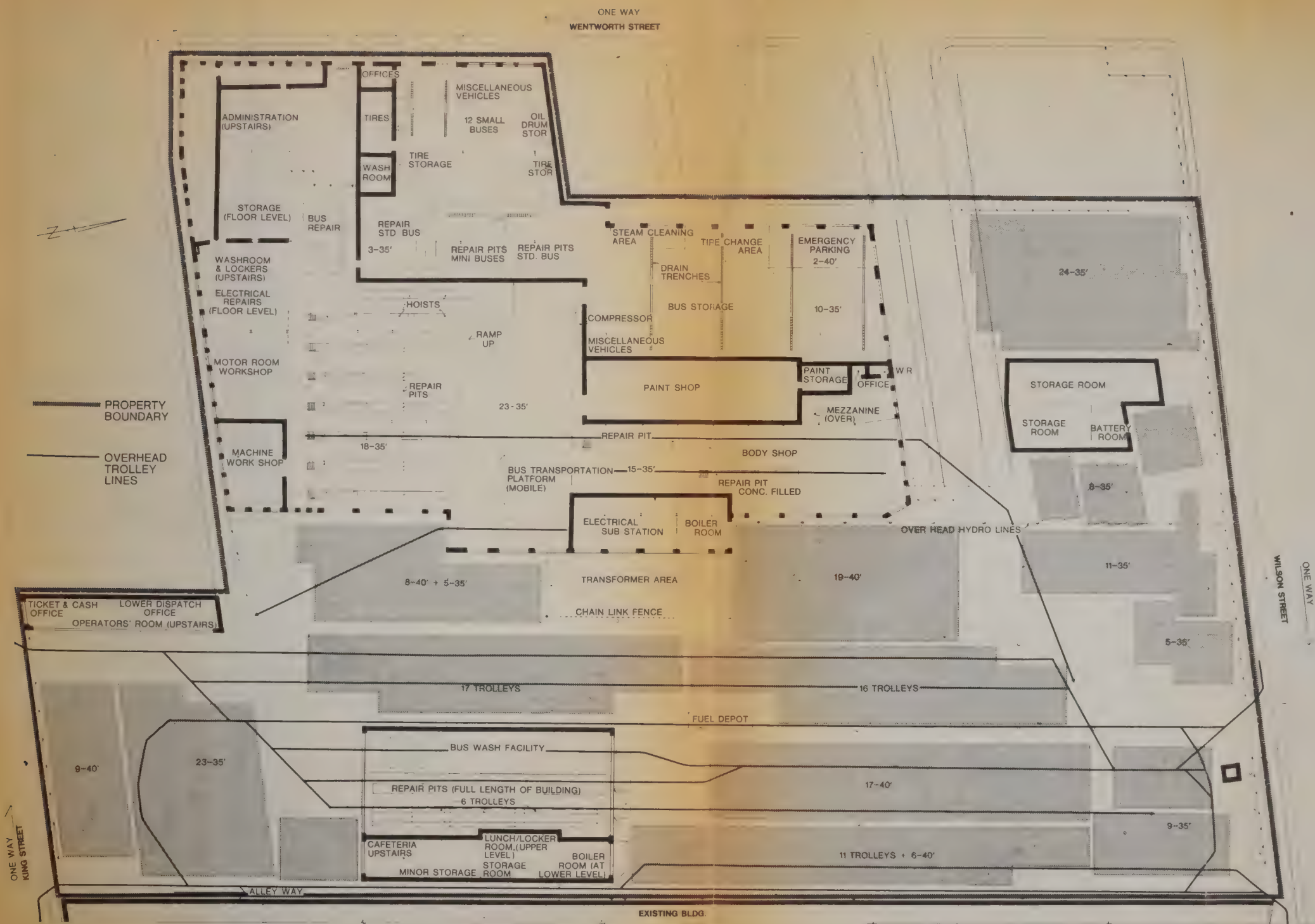


FIGURE 2

HAMILTON STREET
RAILWAY COMPANY,
HAMILTON, ONTARIO

SCHEME I
EXISTING SITE LIMITATIONS
UTILIZING MODERN
STANDARDS

50 - TROLLEYS
57 - 40' BUSES
76 - 35' BUSES
183 TOTAL + 12 SMALL BUSES

BUS OR BUSES

DIRECTION OF
TRAVEL

0 20 40 60 80
FEET

JAMES F. MacLAREN LIMITED

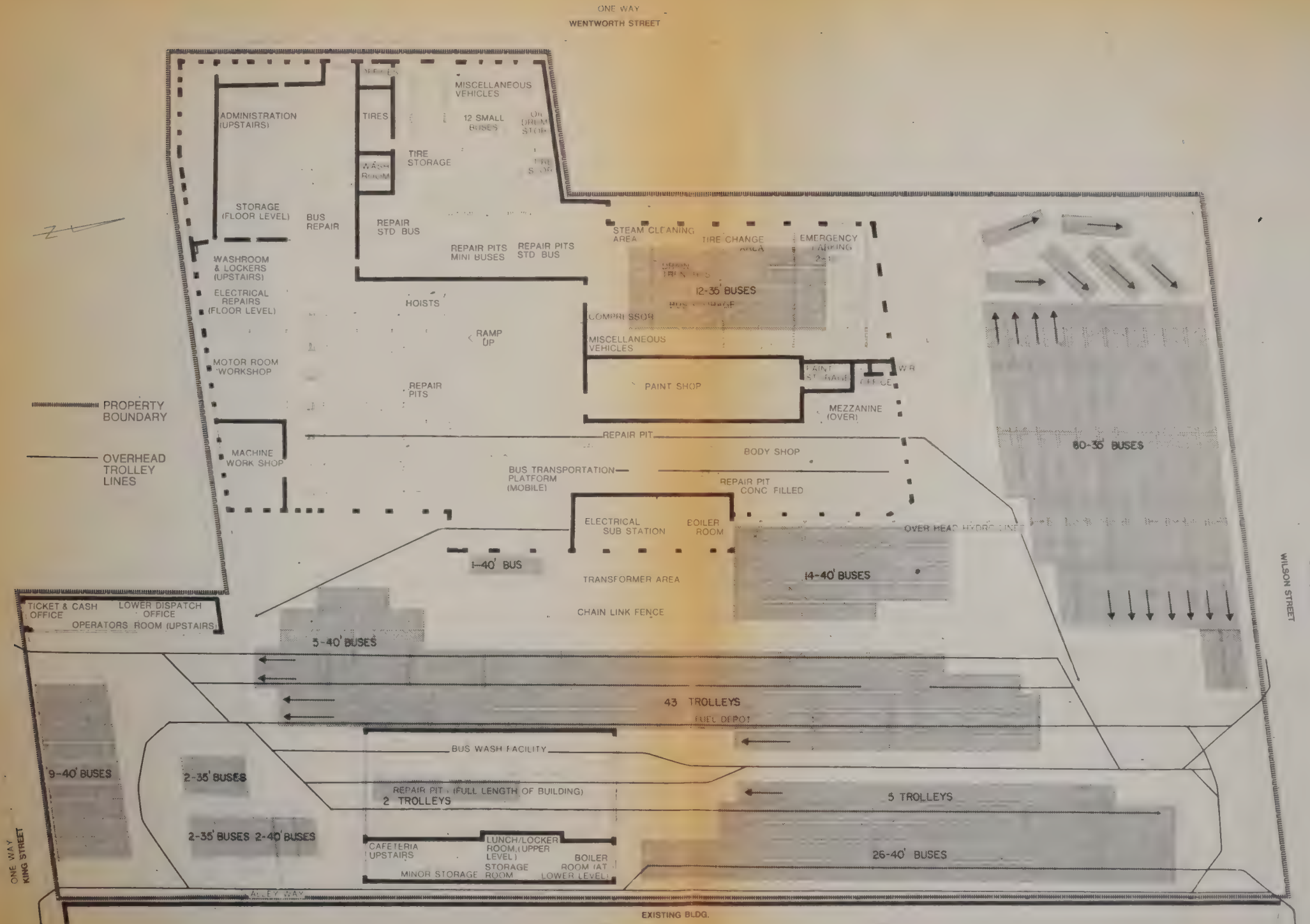


FIGURE 4



HAMILTON STREET
RAILWAY COMPANY,
HAMILTON, ONTARIO

**SCHEME III
EXPANDED SITE
LIMITATIONS WITH
ELEVATED PARKING**

GROUND PARKING
50 - TROLLEYS
38 - 40' BUSES
118 - 35' BUSES
206 TOTAL + 12 SMALL BUSES

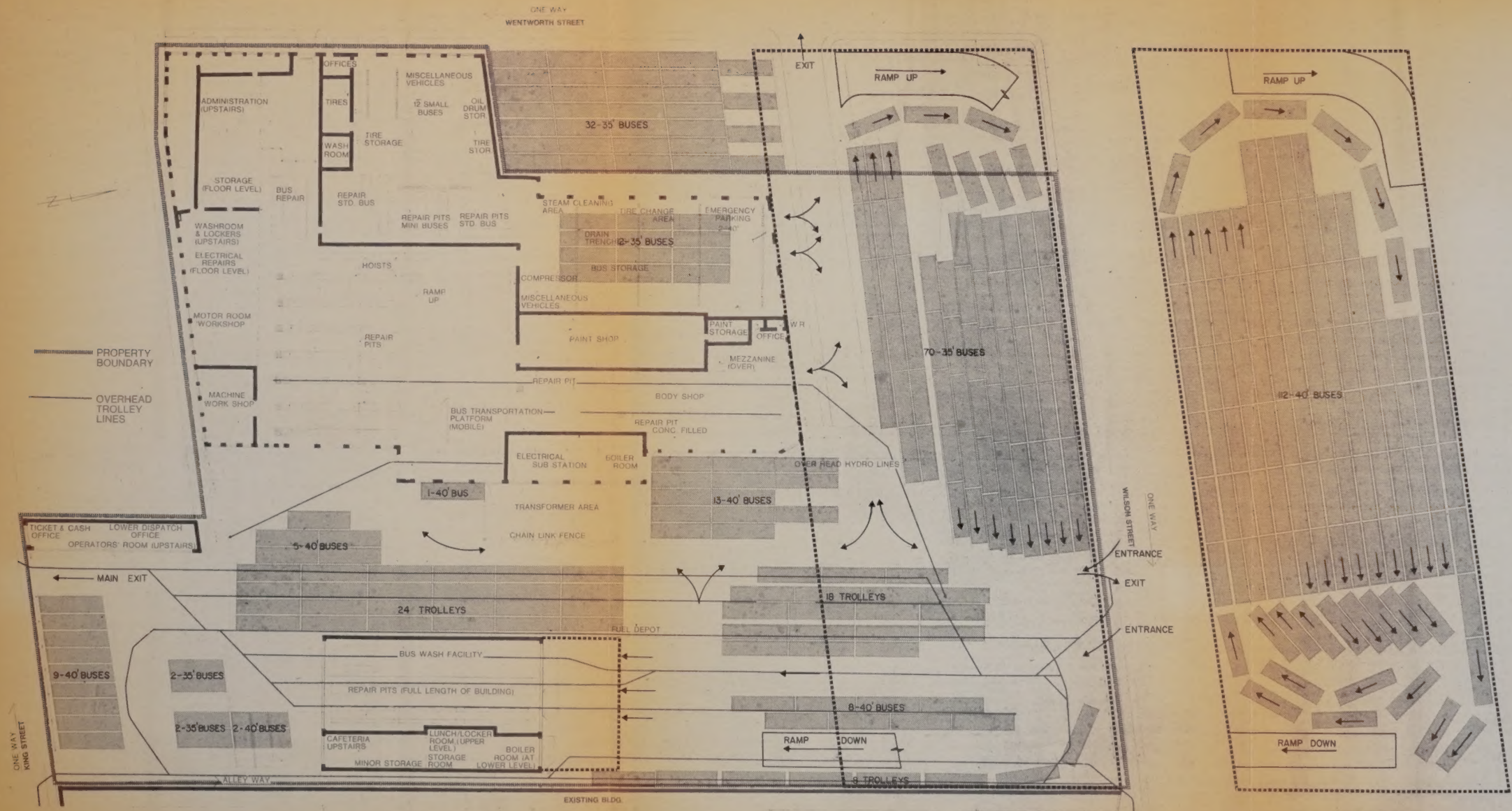
ELEVATED PARKING
112 - 40' BUSES

TOTAL SCHEME
318 + 12 SMALL BUSES

 BUS OR BUSES
 DIRECTION OF TRAVEL

0 20 40 60 80
FEET

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